TRANSPORT TAPE

Field of the Invention

[0001] The invention relates to a transport tape having a multiplicity of pockets arranged next to one another for accommodating the components to be transported, it being possible for the pockets to be closed via a cover. Transport tapes for accommodating electronic or optoelectronic components as preliminary or intermediate products, such as spiral-wound filaments for example, serve to reliably transport and to reliably feed the components to production machines.

Background of the Invention

[0002] The transport tapes are usually provided as blister tapes with pockets for accommodating the components. In order to prevent the components from falling out of the pockets, the latter are closed by a throwaway foil, such as a hot-sealing foil or a self-adhesive cold-sealing foil, to be applied to the transport tape. The filled transport tapes are preferably rolled up on a reel and are thus transferred to a feeder for further processing of the components. In the feeder, the cover is pulled off the transport tape, the components are removed, and the pulled-off cover and the emptied transport tape are fed to a cutting device for cutting up.

[0003] A disadvantage with these known transport tapes is that such transport tapes and covers are not reusable.

[0004] A solution for a reusable transport tape is described in DE 42 07 496 C1. This transport tape primarily serves to accommodate miniature incandescent lamps.

The miniature incandescent lamps are secured on the transport tape via transport-tape tongues which overlap the miniature incandescent lamps section by section in a bridge-like manner.

[0005] A disadvantage with this solution is that the components to be accommodated must meet certain geometrical criteria in order to be able to be enclosed by the bridge-like transport-tape tongues. Furthermore, it is a disadvantage that, in this solution, the components are arranged in an unprotected manner on the surface of the transport tape.

SUMMARY OF THE INVENTION

[0006] One object of the present invention is to provide a transport tape which reduces the aforesaid disadvantages and permits reliable accommodation of electronic or optoelectronic components.

[0007] This and other objects are achieved by a transport tape having a multiplicity of pockets arranged next to one another for accommodating the components to be transported, it being possible for the pockets to be closed via a cover, wherein said cover is formed by lids which are arranged on the transport tape in a pivotable manner or as an alternative, said cover is designed to be displaceable along the transport tape.

[0008] The transport tape according to a preferred embodiment of the invention has a multiplicity of pockets arranged next to one another for accommodating the components to be transported, it being possible for the pockets to be closed via a cover.

Either the cover is formed by a multiplicity of lids which are arranged on the transport tape in a pivotable manner, or the cover is designed to be displaceable along the transport tape.

[0009] In the transport tapes according to a preferred embodiment of the invention, the pockets, each time a component is removed, can be refilled and can be closed again by means of the lids or the displaceable cover, so that the transport tape can be reused. Consequently, the costs for packaging and feeding can be reduced.

[0010] Furthermore, in contrast to conventional transport tapes having a throwaway foil as cover, the lids can be opened and closed individually. Furthermore, they can be closed more quickly, so that shorter production times can be realized.

[0011] Furthermore, the components are accommodated in an orderly and protected manner in the pockets, so that the transport tapes according to the invention are especially suitable for the components which are considered to be problematical in the case of a conventional vibration feed.

[0012] In a preferred embodiment, the transport tape is a blister tape on which the lids are mounted on the transport tape via articulations. The articulations are preferably formed in one piece with the transport tape and are preferably designed as a type of film hinge in the form of a material reduction.

[0013] The lids are preferably secured against opening in the closed position by friction grip and/or form grip. Inadvertent wetting or contamination of the components with adhesive, such as in the case of known integral connections when using a throwaway foil, is therefore ruled out.

[0014] The lids ideally have in each case a projection which engages in the pockets and, with outer peripheral sections, bears over the surface area against inner peripheral sections of the pockets and thus becomes clamped. In one embodiment, the pockets and the projections have a parallelepipedal shape. According to the especially preferred exemplary embodiments of the invention, the shape of the pockets is adapted to the contour of the articles to be transported.

[0015] For reliable and trouble-free guidance of the transport tape on a reel or in a feeder, guide apertures are provided on the transport tape.

[0016] In two preferred exemplary embodiments of the invention, the transport tape is composed of two tapes, a component tape, which is provided with the pockets for the components to be transported, and a tape for closing these pockets. According to the first of these two exemplary embodiments, the tape for closing the pockets is designed as a lid tape which is provided with a multiplicity of pivotable lids. The lid tape is advantageously connected to the component tape by riveting or welding. According to the other exemplary embodiment, the tape for closing the pockets is designed as a cover which is arranged to be displaceable along the component tape. The pockets of the component tape are opened or closed one after the other by displacing the closure tape along the component tape. The construction of the transport tape from a component tape and a second tape for closing the pockets has the advantage that the transport tape can be produced in a simple manner and it can be reused many times. In addition, the parts of the transport tape which are subjected to wear, such as, for example, the tape for closing the pockets, could thus consist of metal, in particular a

metal strip, and the component tape subjected to less stress could consist of plastic. In particular, the lid hinges of the lid tape advantageously consist of metal. In order to protect the guide apertures which are likewise subjected to wear and serve to reliably guide the transport tape on a reel or in a feeder, these guide apertures may be reinforced, for example, by means of a metallic perforated strip arranged over them. Instead of the use of the aforesaid metallic perforated strip, however, the component tape, which is preferably provided with the guide apertures, or the entire transport tape may also consist of metal or metal strips.

[0017] According to a further preferred embodiment of the invention, the transport tape is provided with a cover for the pockets, this cover consisting of a multiplicity of lids arranged to be displaceable along the transport tape. These lids cover at least one pocket, preferably exactly one pocket, and are preferably in each case displaceable individually along the transport tape. They are fixed to the side edges of the transport tape, for example, in each case by means of a snap or catch connection.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The invention is described in more detail below with reference to schematic representations. In the drawing:

[0019] Figure 1 shows a perspective overall view of a first exemplary embodiment of the transport tape in opened position,

[0020] Figure 2 shows a perspective overall view of the transport tape according to Figure 1 in intermediate positions, and

[0021] Figure 3 shows a perspective overall view of the transport tape according to Figure 1 in closed position,

[0022] Figure 4 shows a perspective, schematic representation of a section of the second exemplary embodiment of the transport tape according to the invention,

[0023] Figure 5 shows a cross section through the transport tape depicted in Figure 4,

[0024] Figure 6 shows a plan view of a third exemplary embodiment of the transport tape according to the invention,

[0025] Figure 7 shows a side view of the transport tape depicted in Figure 6,

[0026] Figure 8 shows a cross section through the transport tape depicted in Figure 6,

[0027] Figure 9 shows a plan view of a fourth exemplary embodiment of the transport tape according to the invention,

[0028] Figure 10 shows a side view of the transport tape depicted in Figure 9,

[0029] Figure 11 shows a cross section through the transport tape depicted in Figure 9.

DETAILED DESCRIPTION OF THE DRAWINGS

[0030] The first exemplary embodiment, depicted in Figure 1, of the transport tape 2 according to the invention is designed as a blister tape for accommodating electronic or optoelectronic components, for example semiconductor components (not

shown). The transport tape 2 has a base 4 and a multiplicity of lids 6 extending away from the base 4 in a lug-like manner.

[0031] The base 4 is provided with a multiplicity of pockets 16 arranged next to one another in the longitudinal direction of the transport tape 2. These pockets 16 are preferably deep-drawn and form in each case a cup-like hollow body which is accessible from the front side 18 of the base 4. The pockets 16 are preferably parallelepiped-shaped, but spherical or ellipsoidal pockets 16 are also conceivable. The size of the pockets 16 is ideally dimensioned in such a way that in each case a component can be accommodated in a pocket 16.

[0032] The lids 6 serve to close the pockets 16. They are each pivotably fastened to a longitudinal side 10 of the base 4 via an articulation 8. The articulations 8 are formed in one piece with the base 4 and the lids 6 and are preferably shaped as film hinges by means of a material reduction relative to the base 4 and the lids 6.

[0033] The lids 6 each have a projection 22 which is formed on an underside 26 of the lid 6 and can plunge into the pockets 16 in the closed position (Figure 3) via a pivoting movement of the lids 6 (Figure 2). The external dimensions of the projections 22 are selected in such a way that they are frictionally accommodated in the pockets 16, thereby permitting repeated opening and closing of the pockets 16 and thus reuse of the transport tape 4. The projections 22 are parallelepiped-shaped in accordance with the shape of the pockets 16. In the closed position, the projections 22, with outer peripheral sections 28, become clamped on inner peripheral sections 30 of the pockets 16, preferably over the surface area. On account of the smaller depth of the projections 22

compared with the pockets 16, the projections 22, with their bottom surfaces 32, are at a distance from opposite bottom surfaces 34 of the pockets 16, so that an intermediate space for accommodating the components is formed.

[0034] In order to be able to produce the transport tape 2 as simply as possible and in order to save weight, the projections 22 are designed to be hollow as viewed from a top side 24 of the lids 6. The length of the lids 6 is selected in such a way that the guide apertures 14 are not concealed by the lids 6 in the closed position (Figure 3).

[0035] Guide apertures 14 in the form of perforations for the reliable guidance of the transport tape, for example on a reel or in a feeder, are provided on that longitudinal side region 12 of the base 4 which is remote from the lids 6.

[0036] However, it is also conceivable for the lids 6 and the base 4 to be produced separately from one another and for the lids 6 to be fastened to the base 4 by integral connection, such as welding for example.

[0037] A second exemplary embodiment of the transport tape according to the invention which serves to transport spiral-wound filaments for incandescent lamps is shown schematically in Figures 4 and 5. This transport tape has a component tape 100 which consists of a plastic or metal strip and has a multiplicity of deep-drawn pockets or component nests 101 arranged next to one another. These pockets or component nests 101 serve to accommodate a respective spiral-wound filament (not depicted). The thickness and the material of the plastic or metal strip from which the component tape 100 is made are selected in such a way that the component tape 100 is sufficiently flexible in order to be able to roll it up on a supply reel and in addition has sufficient

dimensional stability. The shape of the component nests 101 is adapted to the outer contour of the spiral-wound filament to be transported. The component nests 101 are arranged one behind the other in the same orientation on the component tape 100, so that the spiral-wound filaments arranged in the nests 101 can be removed by the gripping tool of an automated production plant. Guide apertures 102 which serve to guide the component tape 100 or the transport tape in a feeder are arranged along a side edge of the component tape 100 in an equispaced manner over the entire length of the component tape 100.

[0038] A lid tape 200 is fastened on the top side of the component tape 100 by means of rivets 201. The lid tape 200 consists of a perforated strip 202 which is provided with a multiplicity of holes 205, a multiplicity of hinges 203 and a multiplicity of lids 204 arranged so as to be pivotable about the hinges 203. The holes 205 serve to guide the lid tape 200. After the lid tape 200 has been fitted on the component tape 100, the holes 205 are arranged in a congruent manner over the guide apertures 102 of the component tape 100. The lids 204 serve to close the component nests 101 of the component tape 100. For this purpose, the lids 204 have a catch 206 which catches behind that side edge 103 of the component tape 100 which is opposite the hinges 203 and the guide apertures 102. The perforated strip 202 with the hinges 203 is preferably produced from a metal strip, whereas the lids 204 are preferably produced from plastic. However, it is also possible to produce the entire transport tape from the same material, for example from a plastic or a metal. Instead of the hinges 203, the lids 204 may also

be provided with film articulations, as have been described in the first exemplary embodiment.

[0039] A third exemplary embodiment of the transport tape according to the invention is shown in Figures 6 to 8. This transport tape has a component tape 300 which consists of a plastic or metal strip and has a multiplicity of deep-drawn pockets or component nests 301 arranged next to one another. These pockets or component nests 301 serve to accommodate a respective spiral-wound filament (not depicted). The thickness and the material of the plastic or metal strip from which the component tape 300 is made are selected in such a way that the component tape 300 is sufficiently flexible in order to be able to roll it up on a supply reel and in addition has sufficient dimensional stability. The shape of the component nests 301 is adapted to the outer contour of the spiral-wound filament to be transported. The component nests 301 are arranged one behind the other in the same orientation on the component tape 300, so that the spiral-wound filaments arranged in the nests 301 can be removed by the gripping tool of an automated production plant. Guide apertures 302 which serve to guide the component tape 300 or the transport tape in a feeder are arranged along a side edge of the component tape 300 in an equispaced manner over the entire length of the component tape 300.

[0040] A multiplicity of lids 303 are arranged on the component tape 300 in such a way as to be displaceable along the latter. The lids 303 are designed in such a way that they can in each case cover a pocket or a component nest 301 if they are correspondingly placed over it. The lids 303 enclose the side edges of the component

tape 300 in such a way that they can be displaced along the component tape 300 in a similar manner to on a rail. Arranged in each case on the top side of the lids 303 are two studs 304 which serve to displace the lids 303 relative to the component tape 300 by means of an automatic machine or a production machine. Instead of studs 304, however, the lids 303 may also be provided with guide apertures which differ from the guide apertures of the component tape 300. The lids 303 consist of plastic or metal. To remove the components arranged in the pockets or nests 301, the lids 303 are in each case displaced by one position, i.e. are pushed onto the component nest 301 emptied immediately beforehand. After the complete emptying of the transport tape, the last component nest 301 is open. The transport tape is fitted with components again in the reverse sequence. When the transport tape is being fitted with components, the lids are in each case pushed by one position onto the component nest 301 with component just fitted. As a result, the component nest with component just fitted is covered and at the same time the adjacent component nest is opened for fitting with a component.

[0041] A fourth exemplary embodiment of the transport tape according to the invention is shown in Figures 9 to 11. This transport tape has a component tape 400 which consists of a plastic or metal strip and has a multiplicity of deep-drawn pockets or component nests 401 arranged next to one another. These pockets or component nests 401 serve to accommodate a respective spiral-wound filament (not depicted). The thickness and the material of the plastic or metal strip from which the component tape 400 is made are selected in such a way that the component tape 400 is sufficiently flexible in order to be able to roll it up on a supply reel and in addition has sufficient

dimensional stability. The shape of the component nests 401 is adapted to the outer contour of the spiral-wound filament to be transported. The component nests 401 are arranged one behind the other in the same orientation on the component tape 400, so that the spiral-wound filaments arranged in the nests 401 can be removed by the gripping tool of an automated production plant. Guide apertures 402 which serve to guide the component tape 400 or the transport tape in a feeder are arranged along a side edge of the component tape 400 in an equispaced manner over the entire length of the component tape 400.

[0042] The component nests 401 are covered by means of a lid tape 403 which is arranged on the component tape 400 in a displaceable manner. The component tape 400 and the lid tape 403 together form the transport tape. The lid tape 403 encloses the side edges of the component tape 400, so that it is displaceable as on a rail along the component tape 400. The pockets or component nests 401 are opened or closed one after the other by displacing the lid tape 403. On its top side, along at least one of its side edges, the lid tape 403 has a multiplicity of studs 404 which permit a displacement of the lid tape 403 relative to the component tape 400 by means of an automatic machine or a production machine. Instead of studs 404, however, the lid tape 403 may also have guide apertures which differ from the guide apertures 402 of the component tape 400.